Summary Minutes of the

U.S. Department of Energy (DOE)
Secretary of Energy Advisory Board
Public Meeting

Committee Members:	John Deutch, Chair; Arun Majumdar, Vice Chair; Carol Browner, Michael Greenstone, Paula Hammond, Michael McQuade (via phone), Richard Meserve, Richard Mies, Dan Reicher, Ram Shenoy, Linda Stuntz, Harold Varmus
Date and Time:	September 22, 2016, 8:45 AM – 12:10 PM ET
Location:	The U.S. Department of Energy (DOE), Room 1E-245 1000 Independence Avenue SW, Washington, DC 20585
Purpose:	Quarterly Meeting of the Secretary of Energy Advisory Board (SEAB)
SEAB Staff:	Karen Gibson, Director and Designated Federal Officer; Maria Callejas, Deputy Director; Max Bonardi, Special Assistant
Presenters:	Elizabeth Sherwood Randall, Deputy Secretary of Energy, Frank Klotz, Administrator, NNSA

Meeting Summary

SEAB members heard opening remarks by Deputy Secretary Elizabeth Sherwood Randall. Following her remarks, SEAB members discussed three of their recently completed reports: Biomedical Sciences, Federal Energy Management, and the Future of Nuclear Power. After discussion and an opportunity for public comment, the Board voted to approve the reports. Arun Majumdar gave updates on two task forces he chairs: DOE National Laboratories and CO_2 Utilization. The final presentation was by Frank Klotz on DOE support of the Prague agenda. The meeting adjourned at 12:10 PM.

Opening of the Public Meeting

The meeting was called to order at 8:45 AM by SEAB Chair, John Deutch. He welcomed Deputy Secretary Sherwood Randall and asked her to say a few words. In her opening remarks, Deputy Secretary Sherwood Randall welcomed the public who were in attendance and thanked SEAB members for the considerable time and effort they have dedicated in ensuring that the Department of Energy remains effective in the performance of its vital missions on behalf of the American people. She highlighted the various opportunities we have as we near the end of the administration. In particular, she talked about congressional interest in DOE, including Secretary Moniz's testimony before the Senate Energy and Water Development Subcommittee of the Appropriations Committee on the future of nuclear power; before the House Energy and Commerce Subcommittee on Energy and Power on DOE's role in advancing the national economic and energy security of the United States; and at a field hearing in Seattle of the Senate Committee on Energy and Natural Resources on DOE's functions and capabilities to respond to energy related emergencies.

The Deputy Secretary noted that since the last SEAB meeting on June 14, 2016, DOE has made strides to improve its emergency response capabilities with interagency and industry partners. A key part of this

effort has been focused on preparedness exercises, including the Clear Path exercise last April. Through discussions with partners in the private sector and across government agencies, DOE has committed to integrating and prioritizing industry and government R&D efforts to improve the resiliency and security of the grid. DOE has also continued its work to expedite the commercialization of new technologies developed by the DOE labs. One goal is to ensure that DOE is maximizing the prospect for rapid deployment of the technologies that can contribute to securing the nation's energy infrastructure. She also described how DOE is busy implementing the DOE cyber strategy, combining individual cyber centers into a collaborative distributed approach. The Deputy Secretary also highlighted the Quadrennial Energy Review, noting that the first installment focused on the transmission, storage, and distribution infrastructure and the QER team is pushing hard to finish the second installment focused on the electricity system as a whole, from generation to end use.

The Deputy Secretary provided an update on the commitment to clean energy innovation that resulted from last year's Climate Talks at which President Obama and 19 other world leaders announced a new international investment initiative called Mission Innovation (MI). Under MI, members have committed to doubling government investments in clean energy research and development over the next five years. At the inaugural MI ministerial meeting in San Francisco that took place in June of this year, members set the group's aggregated baseline for investment at $15 billion per year. The group will work to double funding to $30 billion annually by 2021. U.S. investments through MI will enable DOE and our 17 national laboratories to expand our own research, our programs supporting development and deployment of new technologies and will provide support for outside research at every stage of the innovation chain.

The Deputy Secretary concluded by thanking SEAB for the three reports they have produced and will vote on during the meeting. She acknowledged the report on Federal Energy Management, which reviewed the federal government's energy use and management and has tremendous opportunity to provide guidance on how the federal government can cut energy use and advance clean energy deployment; the report on Biomedical Sciences, which identifies and evaluates areas of research within DOE that could help speed up progress within biomedical sciences in partnership with the National Institute of Health and other agencies, and could play a key role in the Administration's Cancer Moonshot initiative; and the Future of Nuclear Power report, which describes a new nuclear power initiative that would lead to significant deployments of one or more new nuclear technologies between 2030 and 2050 and could be a vital contribution to the role nuclear power has in reducing carbon dioxide emissions and slowing climate change.

<u>SEAB Discussion and Consideration of Task Force Recommendations (Vote on Draft Reports)</u>
Harold Varmus presented the **Biomedical Sciences draft report**. The task force was charged by the Secretary to identify new areas for research by DOE investigators that could significantly advance the pace of progress in biomedical sciences and identify new mechanisms for conducting research in coordination with scientists from government laboratories (both DOE and the NIH), universities, academic medical centers and industry. Dr. Varmus reported that the premises used by the task force to develop the report included, but were not limited to: the belief that biomedical sciences are vital to the nation; biomedical research depends on many disciplines; scientific responsibilities and agencies are imperfectly aligned; relevant technologies could be developed more efficiently; and that despite cultural differences, DOE and NIH are well suited to form partnerships.

He described the two cultures – DOE as mission driven and NIH as largely investigator initiated – and a brief history of their interactions. The study findings identified DOE capabilities and biomedical applications, and resulted in the following recommendations:

1. Identify areas for joint research programs – DOE and NIH should impanel experts for this purpose on a regular basis.
2. Bring diverse researchers together and co-train to overcome cultural differences, including through cross-agency assignments, summer gatherings, grant supplements, and novel training programs.
3. Establish facilities, such as "foundries", for desirable large scale collaborative projects which recognize the virtues of past efforts, act on recommendations of informed panels, and negotiate with relevant parties.
4. Inform OMB, Congress and the public about strategies, proposed activities, and virtues of enhanced collaboration.

A comment raised during the meeting referred to the high cost of healthcare and whether there are opportunities to find ways to reduce costs. The report could influence better delivery of healthcare and better use of computational data and capabilities, but did not take on the issue of healthcare cost. The report will be available to the public, Congress, and the current and next Administration, and opens up interesting potential interactions.

Dan Reicher presented the **Federal Energy Management draft report**. The draft report is a result of Executive Order 13693 set forth by President Obama which sets new and more stringent goals for Federal agencies in a range of areas. Secretary Moniz requested that SEAB review the implications of the new Executive Order and review recent efforts by FEMP in several areas including: strategies to cut energy use and accelerate renewable energy; use of performance contracting and power purchase agreements to achieve energy and greenhouse gas reduction goals; use of federal lands and/or assets to support clean energy deployment; energy-saving approaches to federal fleets and employee commuting; use of RCTs to measure energy savings/emissions reductions; and to recommend a set of actions, including possible alternative financing approaches and organization changes that can accelerate progress in DOE-supported Federal energy management over the next two years and over the next five years. SEAB identified 10 major opportunities for improved Federal energy management:

1. Federal Energy Goals: How Good a Tool for Federal Energy Management? There are many numeric targets set by Congress with a lot of specificity, but do these make sense? There are strong arguments on both sides. The task force did not reach consensus on the value of applying detailed, numeric goals to each Federal agency, but supports maintaining the overall approach because of its simplicity, transparency, and results to date. The task force recommends that the next administration take a closer look.
2. Improve Federal Energy Efficiency Projects Through Better Evaluation, Measurement and Verification and Use of RCTs. How do you evaluate, measure, and verify energy efficiency? The Federal Government has pushed for increasing the energy efficiency of its buildings, but evaluations require detailed energy consumption data and verification. Not many federal buildings have energy meters. Randomized Control Trials (RCTs) could be applied, but need good data and a similar set of buildings. The task force recommended pilot projects, but pointed to the need for more smart meters in Federal buildings.
3. Accelerate the Use of Energy Savings Performance Contracts. ESPCs allow Federal agencies to use private financing to fund investments designed to improved energy efficiency and related energy goals and are repaid over time out of savings. They have become an important

alternative to getting appropriated dollars, but the Federal targets are set to end by the end of 2016. The task force recommends new contracting goals for the 2016-2018 period.

4. Reduce the Federal Carbon Footprint by Cutting the Federal Real Estate Footprint. If you can cut square footage, you can reduce energy usage and carbon emissions. The task force recommends making reducing the Federal real estate footprint an explicit part of its strategy for improving Federal energy performance. While the task force debated the BRAC process, there was no recommendation for a BRAC.
5. Improve Federal Procurement of Renewable Energy. The federal government sets goals for acquiring renewable energy. One way is through power purchase agreements (PPAs). These have been used in DOD, but are very complex.
6. Increase the Role of the Power Marketing Administrations in Renewable Energy Deployment. PMAs are an arm of DOE with authorities and resources. The PMAs market electricity generated at federally owned and operated hydropower facilities primarily to preference customers – municipally owned electric utilities and rural electric cooperatives. The task force recommendations focus on role PMAs could play in achieving key energy policy goals and suggest a series of stakeholder meetings to assess opportunities and potential next steps.
7. Address Barriers to Expanding Clean Energy Development on Federal Lands. Challenges for renewables have been substantial – permitting, wildlife, etc. The Department of the interior has primary jurisdiction over public lands, but DOE is well positioned to coordinate and help speed deployment of renewables on Federal lands in an environmentally responsible way. The report makes suggestions for addressing barriers to scaling up clean energy on public lands.
8. Increase Federal Deployment of Alternative Fuel Vehicles. Alternative fuel vehicle acquisition rates have come close to meeting Federal requirements, but actual alternative fuel use in Federal fleets has been low. Electric vehicles not viewed over lifecycle but at first costs. The task force recommends lowering the cost of AFVs to make them more competitive with conventional vehicles.
9. Expand the Role of Military Bases and Federal Buildings as Energy Technology Test Beds. The Federal Government has a long history of successful energy technology test beds, but limited in funding.
10. Strengthen FEMP's Budget, Standing, and Relationships. FEMP is an office within EERE with a lot of responsibilities, but limited funding. The office carries out its duties with a modest budget and staff. The Task force suggests a review of FEMP's budget with respect to current work and high priority areas for potential additional funding; and recommends raising the profile of the office.

John Deutch presented the **Future of Nuclear Power draft report.** The draft report describes a U.S. led new nuclear power initiative with significant capacity to deploy units by 2030-2050 with the principal motivation for this initiative being the vital contribution that nuclear power, along with other carbon free technologies, can make to avoiding worldwide emissions. He emphasized that the report provides a template for time and cost to go forward, but did not recommend whether or not the U.S. *should* develop a nuclear power initiative. The report concludes that:

1. Nuclear is not cost competitive with natural gas at currently projected prices – but natural gas prices are notoriously volatile.
2. Absent a carbon emission price, the Administration should extend a 2.7 ¢/kWe-hr payment for existing and new nuclear generation.
3. A new quasi-public corporation should be established to manage an advanced nuclear initiative.
    (a) The task force estimates the cost and time for a four phase program at $11.5 billion over 25 years with 50% public/private split.

(b) The corporation should be funded by a one-time congressional appropriation.
(c) The corporation should operate in a largely commercial manner, free of the Federal acquisition and personnel restrictions and the annual budget/appropriation cycle.

4. Attention to safety, security and fuel cycle/waste are integral to successful future nuclear systems.
5. A nuclear accident anywhere is a nuclear accident every everywhere.
6. There is no shortcut to reestablish a vigorous U.S. nuclear power initiative that could be a major source of carbon-free generation.
7. Such an initiative will take time, significant public resources, restructured electricity markets, and sustained and skilled management attention.

He concluded by noting that there is no shortcut to reestablish a U.S. nuclear power initiative that could be a major source of carbon-free generation and that such an initiative will take time, significant resources, and needs to begin now, if the Nation wants an Advanced Nuclear option 20-30 years in the future.

At the conclusion of these presentations, a motion was made to approve all three reports with minor modifications to include comments heard during the meeting and transmit the final reports to the Secretary. The motion carried and all three reports were approved.

Public Comment Period

There was one public comment made. Janine Wise Thompson, Vice President at Cassidy & Associates, made a public comment on behalf of the Center for Carbon Removal. Ms. Thompson described the Center and announced it had developed new technology that SEAB may want to assess. The Chair thanked Ms. Thompson.

Updates from SEAB Task Force Chairs

Arun Majumdar provided a brief update on the **National Laboratories Task Force.** He noted that the Department has in the past few years received four reports relating to the DOE-laboratory relationship: the SEAB Lab Task Force Report, the report on the Commission to Review the Effectiveness of the National Energy Laboratories (CRENEL), the Mies-Augustine report, and the NAS report (chaired by Richard Meserve). He said that DOE has really responded to these reports and acknowledged that some of the work is ongoing. He noted that the recommendations and topics of these recent reports overlap and that no additional studies are needed. Rather, now is the time for implementation. He described DOE's active ongoing response to regular briefings received by the Task Force from DOE on its implementation efforts, and NNSA's efforts to incorporate best practices from across DOE into NNSA reforms. He indicated that the Department actively tracks the CRENEL actions that have been implemented and those actions that are ongoing and would extend into the next Administration. He pointed to technology transfer efforts, the importance of user facilities, the intellectual capacity of DOE and the National Labs, efforts to streamline roles and responsibilities. One comment was made bout human capital and morale and the importance of paying attention to the workforce. There was discussion that progress is being made, but many of the ongoing efforts involve culture change, which takes time, and will require continuity into the next Administration.

Dr. Majumdar also provided a brief update on the **CO_2 Utilization Task Force** which was charged by the Secretary in June to develop a report by the end of October on carbon management – both on CO_2 utilization and negative emissions. This is an important issue in order to meet climate goals. The group has been asked to look at an R&D framework on a gigatonne scale. He pointed out that when you

consider the framework on that scale, it ceases to be about strict science and engineering and becomes a project comprised of these two components in the context of economics and scalability. Given the natural flows of carbon, interplay has not really been captured. The report will make some recommendations, including for workshops that should be organized and broad recommendations on topics worth exploring. The report will be shared with a set of external experts to get additional outside input and will contain recommendations for the next Administration. One comment was on the lack of a common framework for the biosphere and atmosphere. There is no easy collaboration. The challenge will be to identify research breakthroughs that might achieve targets, but also think about consequences.

Briefing: DOE Support of Prague Agenda

NNSA Administrator, Frank Klotz presented on the DOE's nuclear deterrent and stockpile stewardship. In Prague, President Obama delivered two principal messages with respect to nuclear weapons. The first was that the U.S. would seek the peace and security of a world without nuclear weapons and the second was that the U.S. would maintain a safe, secure, and effective nuclear deterrent even as it reduced the role of nuclear weapons in the national security strategy and worked toward their eventual elimination. The focus of the presentation was on how NNSA's contribution to sustaining the stockpile can contribute to the first.

Administrator Klotz noted that under the Stockpile Stewardship Program, DOE has developed world-class scientific tools, experimental facilities and high performance supercomputers. These tools have provided a greater understanding of nuclear weapons and this knowledge has provided confidence in the stockpile which has allowed significant reductions in its size and the diversity of warhead types. The stockpile now stands at its lowest level since the early 1950s which is a powerful testament to the country's commitment to reduce the number and role of nuclear weapons over the long term.

Administrator Klotz concluded by noting that while we strive to reduce the number of weapons and maintain a stockpile that is safe, secure, and effective, we also need modern, safe and right-sized infrastructures. He noted that we have 70-year-old facilities doing very high-risk work that have strategic delivery systems well past their intended service lives. He went on to say that DOE has begun assessing associated infrastructures and is working on downsizing and streamlining some of its facilities. As an example, the Kansas City plant, which was recently renovated, resulted in a footprint that was reduced by half, saving the taxpayers $100 million per year in operating expenses. He emphasized the importance of getting this done across the entire nuclear security enterprise.

This concluded the U.S. Department of Energy Secretary of Energy Advisory Board Public Meeting.

Respectfully Submitted:

Karen Gibson
Designated Federal Officer

I hereby certify that these minutes of the October 15, 2015, SEAB meeting are true and correct to the best of my knowledge.

John Deutch
Chair